a lens co-axially disposed with the fiber optic cable for focusing the excitation beam into the volume of the sample and for collecting from the sample and transmitting to the fiber optic cable a first fluorescent signal whose intensity is proportional to the concentration of the amplification reaction product and a second fluorescent signal whose intensity is proportional to the volume of the sample illuminated by the excitation beam; and

a detection and analysis mechanism for receiving the first and second fluorescent signals from the fiber optic cable at a plurality of times during a nucleic acid amplification, the detection and analysis mechanism measuring the intensities of the first and second fluorescent signals at the plurality of times and producing a plurality of corrected intensity signals, each corrected intensity signal corresponding to a [ratio] relationship between the intensities of the first and second fluorescent signals at a given time.

~~33~~.20 (Amended) The method according to claim ~~39~~ 12 wherein performing [at least one] the amplification includes performing at least one cycle of a polymerase chain reaction.

~~34~~.21 (Amended) The method according to claim ~~39~~ 12 wherein performing [at least one] the amplification includes performing at least one cycle of a ligase chain reaction.

~~39~~.12 (Amended) A method for monitoring the formation of a nucleic acid amplification reaction product in real time comprising:

taking a sample holder containing a nucleic acid sequence to be amplified to form a nucleic acid amplification reaction product, a first fluorescent indicator which produces a first fluorescent signal when illuminated by an excitation beam whose intensity is proportional to a concentration of the amplification reaction product in the sample, and a second fluorescent indicator which produces a second fluorescent signal when illuminated by the excitation beam whose intensity is proportional to a volume of sample illuminated by the excitation beam;

[transmitting an excitation beam into the sample holder and measuring the intensities of the first and second fluorescent signals;]

performing [at least one] an amplification of the nucleic acid sequence in the sample holder;

transmitting an excitation beam into the sample holder [after] at a plurality of times during the amplification and measuring the intensities of the first and second fluorescent signals at the plurality of times; and

monitoring the formation of the nucleic acid amplification reaction product in real time by calculating a plurality of corrected intensity [signal] signals, each corrected intensity signal corresponding to a [ratio] relationship between the intensity of the first and second fluorescent signals [at a given time before and after amplifying the nucleic acid sequence] measured at the plurality of times, a change in the corrected intensity signal [after amplification] over time indicating the formation of the nucleic acid amplification reaction product.

~~40.~~ 22. (Amended) A method for monitoring the formation of multiple nucleic acid amplification reaction products in real time comprising:

D3 taking multiple sample holders, each sample holder containing a nucleic acid sequence to be amplified to form a nucleic acid amplification reaction product, a first fluorescent indicator which produces a first fluorescent signal when illuminated by an excitation beam whose intensity is proportional to a concentration of the amplification reaction product in the sample, and a second fluorescent indicator which produces a second fluorescent signal when illuminated by the excitation beam whose intensity is proportional to a volume of sample illuminated by the excitation beam;

[transmitting an excitation beam into the multiple sample holders and measuring the intensities of the first and second fluorescent signals;]

performing [at least one] an amplification of the nucleic acid sequences in the multiple sample holders;

transmitting an excitation beam into the multiple sample holders [after] at a plurality of times during the amplification and measuring the intensities of the first and second fluorescent signals at the plurality of times; and

monitoring the formation of nucleic acid amplification reaction products in the multiple sample holders in real time by calculating a plurality of corrected intensity signals [before and after amplifying the nucleic acid sequences in the multiple sample holders], each corrected intensity signal corresponding to a [ratio] relationship between the intensity of the first and second fluorescent signals [at a given time] measured at the plurality of times, a change in the corrected intensity signal [after amplification] over time indicating the formation of the nucleic acid amplification reaction product.

~~41.~~ 23. (Amended) A method for monitoring the formation of multiple nucleic acid amplification reaction products in real time comprising:

taking a sample holder containing a plurality of nucleic acid sequences to be amplified to form a plurality of nucleic acid amplification reaction products, a plurality of first fluorescent indicators which produce a first fluorescent signal when illuminated by an excitation beam whose intensity is proportional to a concentration of the amplification reaction product in the sample, and a second fluorescent indicator which produces a second fluorescent signal when illuminated by the excitation beam whose intensity is proportional to a volume of sample illuminated by the excitation beam;

[transmitting an excitation beam into the sample holder and measuring the intensities of the first and second fluorescent signals;]

performing [at least one] an amplification of the nucleic acid sequence in the sample holder;

transmitting an excitation beam into the sample holder [after] at a plurality of times during the amplification and measuring the intensities of the first and second fluorescent signals at the plurality of times; and

D3

monitoring the formation of the plurality of nucleic acid amplification reaction products in the sample holder in real time by calculating a plurality of corrected intensity signals [before and after amplification] for each of the plurality of nucleic acid sequences in the sample holder at the plurality of times, each corrected intensity signal corresponding to a [ratio] relationship between the intensity of the first and second fluorescent signals [at a given time] measured at the plurality of times, a change in the corrected intensity signal [after amplification] over time indicating the formation of the nucleic acid amplification reaction product.

24

42. (Amended) A method for monitoring the formation of a nucleic acid amplification reaction product in real time comprising:

taking a sample holder containing a nucleic acid sequence to be amplified to form a nucleic acid amplification reaction product, and first and second fluorescent indicators covalently attached to an oligonucleotide capable of hybridizing to the amplification reaction product, the first fluorescent indicator producing a first fluorescent signal when illuminated by the excitation beam whose intensity is proportional to the concentration of amplification reaction product in the sample, the second fluorescent indicator producing a second fluorescent signal when illuminated by the excitation beam whose intensity is proportional to the volume of the sample illuminated by the excitation beam, the second fluorescent indicator also quenching the fluorescence of the first fluorescent indicator;

[transmitting an excitation beam into the sample holder and measuring the intensities of the first and second fluorescent signals;]

performing [at least one] an amplification of the nucleic acid sequence in the sample holder;

D3 cont'd

transmitting an excitation beam into the sample holder [after] at a plurality of times during the amplification and measuring the intensities of the first and second fluorescent signals at the plurality of times; and

monitoring the formation of the nucleic acid amplification reaction product in real time by calculating a plurality of corrected intensity [signal] signals, each corrected intensity signal corresponding to a [ratio] relationship between the intensity of the first and second fluorescent signals [at a given time before and after amplifying the nucleic acid sequence] at the plurality of times, a change in the corrected intensity signal [after amplification] over time indicating the formation of the nucleic acid amplification reaction product.

Please add the following new claims --

~~43~~. 25 The apparatus according to claim ~~13~~ 1 wherein

the nucleic acid amplification includes a plurality of amplification cycles; and

the detection and analysis mechanism receives the first and second fluorescent signals from the fiber optic cable at least once per amplification cycle and measures the intensities of the first and second fluorescent signals at least once per amplification cycle.

~~44~~. 26 The apparatus according to claim ~~43~~ 25 wherein the detection and analysis mechanism produces at least one corrected intensity signal per amplification cycle.

D4

~~45~~. 27 The method according to claim ~~39~~ 12 wherein

performing the amplification includes performing a plurality of cycles of an amplification reaction; and

transmitting an excitation beam into the sample holder at a plurality of times during the amplification includes transmitting the excitation beam at least once per amplification cycle.

~~46~~. 28 The method according to claim ~~45~~ 27 wherein

monitoring the formation of the nucleic acid amplification reaction product includes calculating at least one corrected intensity signal per amplification cycle. --